

PCTWORLD INTELLECTUAL PROPERTY ORGANIZATION
International Bureau

INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification ⁶ : D04H 13/00, A47L 13/17, B32B 27/12	A1	(11) International Publication Number: WO 98/03713 (43) International Publication Date: 29 January 1998 (29.01.98)
(21) International Application Number: PCT/US97/10723 (22) International Filing Date: 19 June 1997 (19.06.97) (30) Priority Data: 60/022,326 24 July 1996 (24.07.96) US 08/706,621 6 September 1996 (06.09.96) US (71) Applicant: KIMBERLY-CLARK WORLDWIDE, INC. [US/US]; 401 North Lake Street, Neenah, WI 54956 (US). (72) Inventors: AMUNDSON, John, David; 2122 Southwood Drive #1, Appleton, WI 54915 (US). ECKERT, John, Charles; 1523 South Lee Street, Appleton, WI 54915 (US). EVERSON, Mark, George; 1166 Park Village Drive, Neenah, WI 54956 (US). JACKSON, David, Martin; 9825 Summer Oaks Drive, Roswell, GA 30076 (US). SCHULTZ, Walter, Theodore; N9650 Shepherd Lane, Appleton, WI 54915 (US). SMITH, Charles, Allen; 2306 Sandalwood Drive, Atlanta, GA 30350 (US). STRACK, David, Craig; 251 Fox Place, Canton, GA 30114 (US). (74) Agents: CURTIN, Jeffrey, B. et al.; Kimberly-Clark Worldwide, Inc., 401 North Lake Street, Neenah, WI 54956 (US).	(81) Designated States: AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CU, CZ, DE, DK, EE, ES, FI, GB, GE, HU, IL, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, TJ, TM, TR, TT, UA, UG, UZ, VN, ARIPO patent (GH, KE, LS, MW, SD, SZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, ML, MR, NE, SN, TD, TG). Published <i>With international search report.</i>	
(54) Title: WET WIPES WITH IMPROVED SOFTNESS (57) Abstract An improved wet wipe includes a multiple layer basesheet to provide a unique combination of properties to the wipe which are not capable in a single layer basesheet. The layered basesheet includes at least two layers which include different fibers and have different physical properties. One of the layers may include polyethylene fibers to provide a soft, gentle feel for contacting the skin of the user during use while the other layer may include polypropylene fibers to provide strength and resiliency to the wipe to withstand the forces exerted by the user, and maintain its shape and integrity in use.		

FOR THE PURPOSES OF INFORMATION ONLY

Codes used to identify States party to the PCT on the front pages of pamphlets publishing international applications under the PCT.

AL	Albania	ES	Spain	LS	Lesotho	SI	Slovenia
AM	Armenia	FI	Finland	LT	Lithuania	SK	Slovakia
AT	Austria	FR	France	LU	Luxembourg	SN	Senegal
AU	Australia	GA	Gabon	LV	Latvia	SZ	Swaziland
AZ	Azerbaijan	GB	United Kingdom	MC	Monaco	TD	Chad
BA	Bosnia and Herzegovina	GE	Georgia	MD	Republic of Moldova	TG	Togo
BB	Barbados	GH	Ghana	MG	Madagascar	TJ	Tajikistan
BE	Belgium	GN	Guinea	MK	The former Yugoslav Republic of Macedonia	TM	Turkmenistan
BF	Burkina Faso	GR	Greece	ML	Mali	TR	Turkey
BG	Bulgaria	HU	Hungary	MN	Mongolia	TT	Trinidad and Tobago
BJ	Benin	IE	Ireland	MR	Mauritania	UA	Ukraine
BR	Brazil	IL	Israel	MW	Malawi	UG	Uganda
BY	Belarus	IS	Iceland	MX	Mexico	US	United States of America
CA	Canada	IT	Italy	NE	Niger	UZ	Uzbekistan
CF	Central African Republic	JP	Japan	NL	Netherlands	VN	Viet Nam
CG	Congo	KE	Kenya	NO	Norway	YU	Yugoslavia
CH	Switzerland	KG	Kyrgyzstan	NZ	New Zealand	ZW	Zimbabwe
CI	Côte d'Ivoire	KP	Democratic People's Republic of Korea	PL	Poland		
CM	Cameroon	KR	Republic of Korea	PT	Portugal		
CN	China	KZ	Kazakhstan	RO	Romania		
CU	Cuba	LC	Saint Lucia	RU	Russian Federation		
CZ	Czech Republic	LI	Liechtenstein	SD	Sudan		
DE	Germany	LK	Sri Lanka	SE	Sweden		
DK	Denmark	LR	Liberia	SG	Singapore		
EE	Estonia						

WET WIPES WITH IMPROVED SOFTNESS

Background of the InventionField of the Invention

- 5 The present invention relates to wet wipes having improved softness. The invention particularly concerns wet wipes which include a multiple layer basesheet for improved softness and flexibility while maintaining strength and resiliency.

Description of the Related Art

- 10 Wet wipes are well known commercial consumer products which have been available in many forms. Perhaps the most common form of wet wipes has been a stack of moistened sheets which have been packaged in a plastic container. The wet wipes have been made from a variety of materials which have been moistened with a variety of suitable wiping solutions. Such wet wipes have been used for baby wipes, hand wipes,
15 household cleaning wipes, industrial wipes and the like.

- Typically, such conventional wet wipes have included a single layer of a substantially homogeneous material. For example, conventional wet wipes have included an air laid web of fibers which are uniformly mixed or distributed throughout the web. The wipes
20 have included polymeric fibers such as polyester, polyethylene and polypropylene and natural or synthetic fibers such as cellulosic fibers. Other conventional wet wipes have included a coformed web of polypropylene and cellulosic fibers wherein the fibers are uniformly mixed throughout the web.

- 25 However, the balance of physical properties, such as softness, flexibility, strength, integrity and resiliency, of wet wipes having fibers which are uniformly mixed throughout the thickness of the material has not been completely optimized. This has been particularly true for those users desiring improved softness. For example, certain fibers which may be used for wet wipes are stiffer and can provide strength and resiliency but
30 are not as soft or flexible as other fibers. Whereas, other fibers which may be used for wet wipes are softer but may not have sufficient wet strength to withstand the forces exerted by the user. The softness of the wiping surface of the wipes is perceived to be particularly important for baby wipes which are intended to contact the soft skin of an infant. Moreover, the different types of fibers which may provide the desired properties,

such as fibers for strength and fibers for softness, have been difficult to combine in a homogeneous layer due to incompatibilities with each other. Accordingly, it remains desirable to provide wet wipes with improved softness and flexibility while maintaining the strength, integrity and resiliency of the wipes.

5

Summary of the Invention

In response to the difficulties and problems discussed above, new wet wipes which have improved softness and flexibility with adequate strength, integrity and resiliency have been discovered.

10

In one aspect, the present invention relates to a wet wipe which includes a nonwoven, layered basesheet. The layered basesheet includes at least two layers positioned in facing relation with each other wherein one of the layers includes fibers which are not included in the other layer. In a particular embodiment, one of the layers includes polyethylene fibers and one of the layers includes polypropylene fibers.

15

In another aspect, the present invention relates to a multilayer wet wipe which includes a liquid, a first nonwoven outer layer, a second nonwoven outer layer positioned in facing relation with the first outer layer, and a nonwoven inner layer positioned between the first and second layers. The outer layers include different fibers than the inner layer. As such, the outer layer can be configured to provide different physical properties, such as softness, to the wet wipe while the inner layer may be configured to provide other properties, such as strength, to the wet wipe. For example, the first and said second outer layers may include polyethylene fibers for softness and the inner layer may include polypropylene fibers for strength. In a particular embodiment, the outer layers include a mixture of polyethylene fibers and natural fibers and the inner layer includes a mixture of polypropylene fibers and natural fibers.

20

25

In another aspect, the present invention relates to a method of providing wet wipes which includes a) providing a first continuously moving nonwoven layer of material; b) providing a second continuously moving nonwoven layer of material in facing relation with the first nonwoven layer to provide a layered, nonwoven basesheet wherein the second layer contains fibers which are not included in the first layer; c) passing the layered basesheet between a pair of rotatable nip rolls to at least partially secure the first and second layers together; d) adding a liquid to the layered basesheet; and e) cutting the continuously

30

35

moving layered basesheet into individual sheets to provide the wet wipes. In a particular embodiment, the method further includes providing a third continuously moving nonwoven layer of material in facing relation with the second nonwoven layer to sandwich the second layer of material between the first and third layers of material to provide the layered, nonwoven basesheet. The first and third layer may include coform layers of polyethylene fibers and natural fibers and the second layer may include a coform layer of polypropylene fibers and natural fibers.

The present invention, in its various aspects, advantageously provides an improved wet wipe which includes a layered, nonwoven basesheet. The use of a layered basesheet allows the incorporation of different fibers into different layers of the basesheet to provide different properties. Thus, the different layers may be configured to provide the optimum balance of physical properties, such as softness, flexibility, strength, integrity and resiliency to the wet wipes. As a result, the wet wipes according to the present invention have improved performance and consumer acceptance when compared to conventional wet wipes which include a single homogeneous layer.

Detailed Description of the Invention

The present invention relates to new wet wipes which have improved softness while maintaining adequate strength and resiliency and a method of producing the same. The wet wipes of the present invention can be used for baby wipes, hand wipes, face wipes, cosmetic wipes, household wipes, industrial wipes and the like.

The wet wipes of the present invention comprise a layered basesheet which contains a liquid. The liquid can be any solution which can be absorbed into the wet wipe basesheet and may include any suitable components which provide the desired wiping properties. For example, the components may include water, emollients, surfactants, fragrances, preservatives, chelating agents, pH buffers or combinations thereof as are well known to those skilled in the art. The liquid may also contain lotions and/or medicaments.

The amount of liquid contained within each wet wipe may vary depending upon the type of material being used to provide the wet wipe, the type of liquid being used, the type of container being used to store the wet wipes, and the desired end use of the wet wipe. Generally, each wet wipe can contain from about 150 to about 600 weight percent and

desirably from about 250 to about 450 weight percent liquid based on the dry weight of the wipe for improved wiping. In a particular aspect, the amount of liquid contained within the wet wipe is from about 300 to about 400 weight percent and desirably about 330 weight percent based on the dry weight of the wet wipe. If the amount of liquid is less than the above-identified ranges, the wet wipe may be too dry and may not adequately perform. If the amount of liquid is greater than the above-identified ranges, the wet wipe may be oversaturated and soggy and the liquid may pool in the bottom of the container.

Each wet wipe is generally rectangular in shape and may have any suitable unfolded width and length. For example, the wet wipe may have an unfolded length of from about 2.0 to about 80.0 centimeters and desirably from about 10.0 to about 25.0 centimeters and an unfolded width of from about 2.0 to about 80.0 centimeters and desirably from about 10.0 to about 25.0 centimeters. Typically, each individual wet wipe is arranged in a folded configuration and stacked one on top of the other to provide a stack of wet wipes. Such folded configurations are well known to those skilled in the art and include c-folded, z-folded, quarter-folded configurations and the like. The stack of folded wet wipes may be placed in the interior of a container, such as a plastic tub, to provide a package of wet wipes for eventual sale to the consumer. Alternatively, the wet wipes may include a continuous strip of material which has perforations between each wipe and which may be arranged in a stack or wound into a roll for dispensing.

The layered basesheet of the wet wipes of the present invention includes at least two layers of material having different physical properties. The different physical properties which a layer may be configured to provide by selecting the appropriate materials include softness, resiliency, strength, flexibility, integrity, toughness, absorbency, liquid retention, thickness, tear resistance, surface texture, drapability, hand, wettability, wicking ability and the like and combinations thereof. Desirably, the materials used for the layered basesheet are configured to provide softness and flexibility while maintaining adequate strength, integrity and resiliency, particularly when wetted. For example, the wet wipes may include at least one layer of material which is configured to provide strength and resilience to the wet wipe and at least one other layer which is configured to provide a soft, gentle wiping surface to the wet wipe. Desirably, the wet wipes include a soft layer on each side of a strong and resilient layer such that both exposed surfaces of the wipe provide a soft, gentle surface for contact with the skin.

35

Each layer of the wet wipes can be made from a variety of materials including meltblown materials, coform materials, air-laid materials, bonded-carded web materials, hydroentangled materials, spunbond materials and the like and can comprise synthetic or natural fibers. Desirably, all of the layers of the layered basesheet include fibrous materials which provide an improved appearance and feel to the wet wipe. Examples of natural fibers suitable for use in the present invention include cellulosic fibers such as wood pulp fibers, cotton fibers, flax fibers, jute fibers, silk fibers and the like. Examples of thermoplastic polymeric fibers suitable for use with the present invention include polyolefins such as polypropylene and polyethylene, polyamides, and polyesters such as polyethyleneterephthalate. Alternative synthetic fibers which may be suitable include staple nylon and rayon fibers. One of the principle advantages of the present invention is that the types of fibers in each layer of the layered basesheet may be different to achieve a particular combination of physical properties in the final layered basesheet which may not be obtainable using a single layer of material. As a result, the layered basesheet according to the different aspects of the present invention may include different layers which include different fibers which would be incompatible with each other in a single layer.

For example, the layered basesheet of the present invention may include at least one soft and flexible layer which includes soft polymeric fibers, such as linear low density polyethylene fibers and/or other polymeric fibers having similar properties. The soft polymeric fibers may or may not be combined with natural fibers such as cellulosic fibers. The layered basesheet may also include at least one strong, resilient layer which may include resilient polymeric fibers with relatively high tensile strength, such as polypropylene fibers and/or other polymeric fibers having similar properties. Such strong polymeric fibers may or may not be combined with natural fibers such as cellulosic fibers. Desirably, at least one of the layers contains natural fibers such as cellulosic fibers to provide improved thickness and wettability to the basesheet. The natural fibers may also provide void volume within the basesheet which allows for improved moisture retention.

If a layer of the layered basesheet is a combination of polymeric and natural fibers, such as polypropylene and cellulosic fibers, the relative percentages of the polymeric fibers and natural fibers in the layer can vary over a wide range depending on the desired characteristics of the wet wipes. For example, the layer may comprise from about 20 to about 95 weight percent, desirably from about 20 to about 60 weight percent, and more

desirably from about 30 to about 40 weight percent of polymeric fibers based on the dry weight of the layer. Such a layer of polymeric and natural fibers may be manufactured by any method known to those skilled in the art.

5 Generally, it is desirable that such a layer be formed by a coform process for a more uniform distribution of the polymeric and natural fibers within the layer. Such coform layers are manufactured generally as described in U.S. Patent No. 4,100,324 to Anderson et al. which issued July 11, 1978; U.S. Patent No. 4,604,313 to McFarland et al. which issued August 5, 1986; and U.S. Patent No. 5,350,624 which issued September
10 27, 1994; which are herein incorporated by reference to the extent they are consistent herewith. Typically, such coform layers comprise a gas-formed matrix of thermoplastic polymeric meltblown microfibers, such as, for example, polypropylene microfibers, and cellulosic fibers, such as, for example, wood pulp fibers. A coform layer is formed by initially forming at least one primary air stream containing the synthetic or polymeric fibers
15 and merging the primary stream with at least one secondary stream of natural or cellulosic fibers. The primary and secondary streams are merged under turbulent conditions to form an integrated stream containing a thorough, homogeneous distribution of the different fibers. The integrated air stream is directed onto a forming surface to air form the layer of material. A multiplicity of these coform layers can then be formed in
20 succession to provide a web of multiple coform layers.

In a particular embodiment, the wet wipe of the present invention includes a three layer coform basesheet which includes an inner strong, resilient layer positioned between two outer, soft and flexible layers. The inner strong, resilient layer comprises a coformed
25 layer of meltblown polypropylene microfibers and wood pulp fibers wherein the pulp to polymer weight ratio is from about 50/50 to about 75/25 and desirably about 65/35. A suitable polypropylene is available from Montel under the trade designation MONTEL PF015. The outer soft layers comprise a coformed layer of meltblown linear low density polyethylene microfibers and wood pulp fibers wherein the pulp to polymer weight ratio is
30 from about 50/50 to about 75/25 and desirably about 65/35. A suitable polyethylene is available from Dow under the trade designation DOW 6831A.

The different fibers in the different layers of the layered basesheet of the present invention, such as the polypropylene and polyethylene microfibers set forth above,
35 typically may not be compatible with and may not bond to each other. However, the

different fibers may entangle with each other resulting in suitable securement between the layers. For example, in a layered basesheet containing a coform layer of polyethylene and cellulosic fibers and a coform layer of polypropylene and cellulosic fibers, the polyethylene and polypropylene fibers may entangle with each other and the cellulosic fibers and may at least partially bond to the cellulosic fibers which results in securement between the layers.

Such interlayer bonding and entanglement may be enhanced by a thermo-mechanical process wherein the layered basesheet is passed between a heated smooth anvil roll and a heated pattern roll. The pattern roll may have any raised pattern which provides the desired entanglement and interlayer bonding. Desirably, the pattern roll defines a raised pattern which defines a plurality of bond locations which define a bond area of between about 4 and about 30 percent of the total area of the roll for improved interlayer attachment.

The pressure between the rolls and the temperature of the rolls must be balanced to produce a basesheet having adequate strength and integrity while maintaining the softness of the outer layers. The temperature and pressure may vary depending upon the types of fibers being used to provide the desired wet wipe. In a particular embodiment wherein the layers comprise at least one layer of polyethylene fibers and at least one other layer of polypropylene fibers, the pressure between the rolls may be between about 5 and about 90 kilograms per lineal centimeter and the temperature of at least one of the rolls may be between about 65 and about 95 degrees Centigrade for improved entanglement and bonding. Under such conditions of temperature and pressure, the polyethylene fibers deform to provide mechanical entanglement with and possible bonding to the polypropylene fibers. As a result, the layers become entangled and bonded in discrete areas arranged in a pattern which corresponds to the raised pattern on the pattern roll.

The layered basesheet for the wet wipes may have a total basis weight of from about 25 to about 120 grams per square meter and desirably from about 40 to about 90 grams per square meter. Such basis weight of the layered basesheet may also vary depending upon the desired end use of the wet wipe. For example, a suitable basesheet for wiping the skin may define a basis weight of from about 60 to about 80 grams per square meter and desirably about 75 grams per square meter. In a particular embodiment wherein the

layered basesheet includes coform layers of polypropylene and cellulosic fibers and polyethylene and cellulosic fibers, the layered basesheet defines a basis weight of from about 60 to about 90 grams per square meter and desirably about 80 grams per square meter for improved softness and adequate strength.

5

Each layer may or may not have a different basis weight depending upon the desired properties such as strength and softness of the wet wipe. For example, in a three layer coform basesheet which includes an inner layer of polypropylene and wood pulp fibers and two outer layers of polyethylene and wood pulp fibers, the basis weight of the layers
10 may define an outer/inner/outer layer weight ratio of from about 10/80/10 to about 40/20/40, desirably about 25/50/25 to about 33/33/33 and more desirably about 30/40/30 based on a total weight of the basesheet for improved performance.

In a particular embodiment, it is desired that the wet wipe of the present invention define
15 sufficient strength to withstand the forces exerted by the user when it is wetted with solution. For example, the layered basesheet for the wet wipes may define a tensile strength of at least about 1.23 Newtons per centimeter in the machine direction and at least about 0.70 Newtons per centimeter in the cross machine direction for improved performance. As used herein, machine direction refers to the direction in which the
20 material is manufactured while the cross machine direction refers to a direction which is perpendicular to the machine direction. In a particular embodiment, wherein the layered basesheet includes coform layers of polypropylene and cellulosic fibers and polyethylene and cellulosic fibers, the layered basesheet defines a tensile strength of from about 1.31 to about 3.50 Newtons per centimeter in the machine direction and from about 0.84 to
25 about 1.40 Newtons per centimeter in the cross machine direction and desirably from about 1.58 to about 1.93 Newtons per centimeter in the machine direction and from about 0.93 to about 1.11 Newtons per centimeter in the cross machine direction. In such a configuration, the coform layer which includes polypropylene fibers provides the majority of the strength to the basesheet while the coform layer which includes the
30 polyethylene fibers provides a soft surface for contact with the skin of the user. Thus, the tensile strength of such a layered basesheet is higher than the tensile strength of a single layer containing polyethylene fibers and provides a softer surface than a single layer containing polypropylene fibers.

The layered basesheet for the wet wipe of the different aspects of the present invention may be provided on a single manufacturing line which includes multiple individual forming banks. Each forming bank is configured to provide an individual layer having the desired properties. For example, the first and last forming banks may be configured to provide
5 the outer, soft layers while the middle or interior forming banks may be configured to provide at least one inner, strong and resilient layer. The mechanical entanglement between the fibers of each layer during the process provides attachment between the layers and may form bonds between the adjacent layers to provide the layered basesheet. Subsequent thermomechanical bonding may also be used on the layered
10 basesheet to improve the attachment between the layers.

Each forming bank may include the appropriate equipment to provide the desired type of web. For example, if each layer comprises a coform layer of meltblown microfibers and natural fibers such as wood pulp fibers, each forming bank may include a plurality of
15 meltblowing dies as are well known to those skilled in the art. In general, meltblowing processes include meltblowing dies which are configured to extrude a molten polymeric material into fine streams. The fine streams are then attenuated by converging flows of high velocity gas to break the polymer streams into discrete microfibers of small diameter. The stream or streams of natural fibers which are converged with the streams
20 of meltblown microfibers may be provided by a conventional pulp picker roll process as is well known to those skilled in the art.

Alternatively, one or more layers of the wet wipe of the different aspects of the present invention can be made from a different type of material such as a meltblown sheet of
25 polymeric microfibers. For example, the inner, strong and resilient layer may include a layer of meltblown polypropylene fibers while the outer soft layers may include a coform layer of polyethylene and wood pulp fibers as described above. The outer soft and flexible layers may otherwise be provided by different types of materials such as airlaid, carded web, or meltblown materials as are set forth above and which are manufactured
30 by processes well known to those skilled in the art.

Examples

The following examples are presented to provide a more detailed understanding of the invention. The particular materials and parameters are exemplary and are not intended
35 to limit the scope of the invention.

Example 1

Wet wipes were made according to the present invention. Each wet wipe comprised a three layered coform basesheet which included a strong, inner layer positioned between two outer, soft and flexible layers. The strong, inner layer comprised a coform layer of meltblown polypropylene microfibers and wood pulp fibers wherein the pulp to polymer weight ratio was about 65/35. The polypropylene was available from Montel under the trade designation MONTEL PF015. The outer soft layers comprised a coformed layer of meltblown linear low density polyethylene microfibers and wood pulp fibers wherein the pulp to polymer weight ratio was about 65/35. The polyethylene was available from Dow under the trade designation DOW 6831A. The wet wipes had an inner/outer/inner layer weight ratio of about 30/40/30. The wet wipes included a solution similar to that currently being used with Kleenex® Huggies® Unscented Classic Baby Wipes which were commercially available from Kimberly-Clark Corporation, a business having offices located in Neenah, Wisconsin. The wet wipes included about 330 weight percent of the solution based on the dry weight of the wipe.

The wet wipes were subjected to a grab tensile test as is well known to those skilled in the art. The wipes were placed between a pair of jaws and the jaws were pulled apart. The force required to break the wipe was recorded as the tensile strength. The wipes were tested in both the machine direction (MD) and cross machine direction (CD). The wet wipes had an average MD tensile strength of 1.67 Newtons per centimeter (0.95 pounds per inch) and an average CD tensile strength of 1.05 Newtons per centimeter (0.60 pounds per inch).

Comparative Example 1

Kleenex® Huggies® Unscented Classic Baby Wipes which were commercially available from Kimberly-Clark Corporation, a business having offices located in Neenah, Wisconsin were obtained. Each wet wipe comprised a coform basesheet having about 65 weight percent cellulosic fibers and 35 weight percent polypropylene microfibers based on the dry weight of the basesheet. The polypropylene was available from Montel under the trade designation MONTEL PF015. The wet wipes included about 330 weight percent solution based on the dry weight of the basesheet.

The wet wipes were subjected to a grab tensile test as described above. The wet wipes had an average MD tensile strength of 316 Newtons per centimeter (1.80 pounds per

inch) and an average CD tensile strength of 1.45 Newtons per centimeter (0.83 pounds per inch).

Comparative Example 2

5 Wet wipes similar to those in Comparative Example 1 except for the polymer were made. Each wet wipe comprised a coform basesheet having about 65 weight percent cellulosic fibers and 35 weight percent polyethylene microfibers based on the dry weight of the basesheet. The polyethylene was available from Dow under the trade designation DOW 6831A. The wet wipes included about 330 weight percent solution based on the dry
10 weight of the basesheet.

The wet wipes were subjected to a grab tensile test as described above. The wet wipes had an average MD tensile strength of 0.38 Newtons per centimeter (0.22 pounds per inch) and an average CD tensile strength of 0.28 Newtons per centimeter (0.16 pounds
15 per inch).

The wet wipes of Example 1 and Comparative Example 1 were also placed in a use test with 55 participants who used the wipes for five days. The participants were then asked several questions regarding the performance of the wipes. The wet wipes of Example
20 1(the present invention) were statistically preferred for softness over those described in Comparative Example 1.

Thus, the Examples representatively illustrate that the layered basesheet of the present invention may provide wet wipes having improved softness while still providing adequate
25 strength in use to function as a wet wipe. Accordingly, the different aspects of the present invention can advantageously provide wet wipes which, when compared to conventional wet wipes, are softer and have adequate strength and integrity. Such wet wipes have improved consumer acceptance and can advantageously be used for baby wipes, hand wipes, face wipes, cosmetic wipes, household wipes, industrial wipes and
30 the like.

While the invention has been described in detail with respect to the specific aspects thereof, it will be appreciated that those skilled in the art, upon attaining an understanding of the foregoing, may readily conceive of alterations to, variations of, and

equivalents to these aspects. Accordingly, the scope of the present invention should be assessed as that of the appended claims and any equivalents thereto.

What is claimed is:

1. A wet wipe comprising a nonwoven, layered basesheet which includes at least two layers positioned in facing relation with each other wherein at least one of said layers includes fibers which are not included in said other layers.
2. The wet wipe of claim 1 wherein at least one of said layers includes polyethylene fibers and at least one of said layers includes polypropylene fibers.
3. The wet wipe of claim 1 wherein at least one of said layers includes natural fibers.
4. The wet wipe of claim 1 wherein at least one of said layers includes a mixture of natural fibers and polymeric fibers.
5. The wet wipe of claim 4 wherein a weight ratio of said natural fibers to said polymeric fibers in said at least one layer is from about 50/50 to about 75/25.
6. The wet wipe of claim 1 wherein at least one of said layers includes a coform layer of natural fibers and polymeric fibers.
7. The wet wipe of claim 1 and further comprising from about 150 to about 600 weight percent of a liquid based on a dry weight of said wet wipe.
8. The wet wipe of claim 1 wherein said wet wipe defines a tensile strength in a machine direction of at least about 1.23 Newtons per centimeter.
9. The wet wipe of claim 1 wherein said wet wipe defines a total dry basis weight of from about 25 to about 120 grams per square meter.
10. The wet wipe of claim 1 wherein said layers are at least partially entangled together at a plurality of bond locations which define a bond area of from about 4 to about 30 percent of a surface area between the layers.

11. A multilayer wet wipe comprising:
- a) a liquid;
 - b) a first nonwoven outer layer;
 - c) a second nonwoven outer layer positioned in facing relation with said first outer
- 5 layer, and
- d) a nonwoven inner layer positioned in facing relation between said first outer layer and said second outer layer wherein said outer layers include different fibers than said inner layer.
12. The wet wipe of claim 11 wherein said first and said second outer layers include polyethylene fibers.
13. The wet wipe of claim 11 wherein said inner layer includes polypropylene fibers.
14. The wet wipe of claim 11 wherein at least one of said layers includes natural fibers.
15. The wet wipe of claim 11 wherein said first and said second outer layers include a mixture of polyethylene fibers and natural fibers.
16. The wet wipe of claim 15 wherein a weight ratio of said natural fibers to said polyethylene fibers in each of said outer layers is from about 50/50 to about 75/25.
17. The wet wipe of claim 11 wherein said inner layer includes a mixture of polypropylene fibers and natural fibers.
18. The wet wipe of claim 17 wherein a weight ratio of said natural fibers to said polymeric fibers in said inner layer is from about 50/50 to about 75/25.
19. The wet wipe of claim 11 wherein at least one of said layers includes a coform layer of natural fibers and polymeric fibers.
20. The wet wipe of claim 11 wherein said wet wipe includes from about 150 to about 600 weight percent of said liquid based on a dry weight of said wet wipe.

21. The wet wipe of claim 11 wherein a weight ratio of said first outer layer to said inner layer to said second outer layer is from about 10/80/10 to about 40/20/40.

22. The wet wipe of claim 11 wherein said wet wipe defines a tensile strength in a machine direction of at least about 1.23 Newtons per centimeter.

23. The wet wipe of claim 11 wherein said wet wipe defines a total dry basis weight of from about 50 to about 90 grams per square meter.

24. The wet wipe of claim 11 wherein said outer layers are at least partially entangled with said inner layers at a plurality of bond locations which define a bond area of from about 4 to about 30 percent of a surface area between the respective layers.

10

25. A method of providing wet wipes comprising:

a) providing a first continuously moving nonwoven layer of material;

b) providing a second continuously moving nonwoven layer of material in facing relation with said first nonwoven layer to provide a layered, nonwoven basesheet wherein

15

said second layer contains fibers which are not included in said first layer;

c) at least partially securing said first and said second layers together;

d) adding a liquid to said layered basesheet; and

e) cutting said continuously moving layered basesheet into individual sheets to provide said wet wipes.

20

26. The method of claim 25 wherein said first layer includes a coform layer of polymeric fibers and natural fibers.

27. The method of claim 26 wherein said second layer includes a coform layer of polymeric fibers and natural fibers.

28. The method of claim 27 wherein said first layer includes polyethylene fibers and said second layer includes polypropylene fibers.

29. The method of claim 25 wherein said first and second layers are at least partially secured together at bond locations which define a bond area of from about 4 to about 30 percent of a total surface area between said layers.

30. The method of claim 25 wherein said layered basesheet is passed between a pair of rotatable nip rolls to at least partially secure said first and said second layers together.

31. The method of claim 30 wherein one of said nip rolls is heated such that fibers in one of said layers at least partially deform and entangle fibers in said other layer.

32. The method of claim 31 wherein said one nip roll is heated to a temperature of from about 65 to about 95 degrees Centigrade.

33. The method of claim 25 wherein from about 150 to about 600 weight percent of said liquid is added to said layered basesheet based on a dry weight of said layered basesheet.

34. The method of claim 25 and further comprising providing a third continuously moving nonwoven layer of material in facing relation with said second nonwoven layer to sandwich said second layer of material between said first and third layers of material to provide said layered, nonwoven basesheet .

35. The method of claim 34 wherein said first and third layer include polyethylene fibers and said second layer includes polypropylene fibers.

36. The method of claim 34 wherein said first and third layer include coform layers of polyethylene fibers and natural fibers and said second layer includes a coform layer of polypropylene fibers and natural fibers.

INTERNATIONAL SEARCH REPORT

Intern: I Application No
PCT/US 97/10723

A. CLASSIFICATION OF SUBJECT MATTER
IPC 6 D04H13/00 A47L13/17 B32B27/12

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 6 D04H A47L B32B

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 4 741 944 A (JACKSON DAVID M ET AL) 3 May 1988 see the whole document ---	1,7,9, 11,20, 25,33
X	DATABASE WPI Section Ch, Week 9146 Derwent Publications Ltd., London, GB; Class A17, AN 91-337018 XP002043765 & JP 03 227 442 A (ASAHI CHEM IND CO LTD) , 8 October 1991 see abstract --- -/-	1,3

☒ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

* Special categories of cited documents :

- *A* document defining the general state of the art which is not considered to be of particular relevance
- *E* earlier document but published on or after the international filing date
- *L* document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
- *O* document referring to an oral disclosure, use, exhibition or other means
- *P* document published prior to the international filing date but later than the priority date claimed

- *T* later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
- *X* document of particular relevance: the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
- *Y* document of particular relevance: the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.
- *&* document member of the same patent family

Date of the actual completion of the international search

16 October 1997

Date of mailing of the international search report

07. 11. 97

Name and mailing address of the ISA

European Patent Office, P.B. 5818 Patentlaan 2
NL - 2280 HV Rijswijk
Tel. (+31-70) 340-2040, Tx. 31 651 epo nl,
Fax: (+31-70) 340-3016

Authorized officer

Barathe, R

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No
PCT/US 97/10723

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 4741944 A	03-05-88	US 4865221 A	12-09-89
WO 9639553 A	12-12-96	FI 952754 A	07-12-96
US 5512358 A	30-04-96	AU 7957094 A	10-04-95
		BR 9407579 A	16-07-96
		CA 2116196 A	23-03-95
		CN 1133620 A	16-10-96
		EP 0720666 A	10-07-96
		FR 2710346 A	31-03-95
		GB 2282101 A,B	29-03-95
		WO 9508658 A	30-03-95
EP 0370835 A	30-05-90	US 4863785 A	05-09-89
		AT 131776 T	15-01-96
		CA 1311997 A	29-12-92
		DE 68925188 D	01-02-96
		DE 68925188 T	09-05-96
		ES 2082790 T	01-04-96
US 4837078 A	06-06-89	CA 1315080 A	30-03-93
EP 0557659 A	01-09-93	JP 5179558 A	20-07-93
		CA 2086033 A	28-06-93
		KR 9504162 B	27-04-95
		US 5366792 A	22-11-94

INTERNATIONAL SEARCH REPORT

Intern. al Application No
PCT/US 97/10723

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	DATABASE WPI Section Ch, Week 9227 Derwent Publications Ltd., London, GB; Class A32, AN 92-222372 XP002043766 & JP 04 146 257 A (NISSHINBO IND INC) , 20 May 1992 see abstract	1,3
P,A	WO 96 39553 A (UPM KYMMENE OY ;PIRINEN PENTTI (FI); NIEMI TAPIO (FI)) 12 December 1996	1
A	US 5 512 358 A (SHAWVER SUSAN E ET AL) 30 April 1996 see column 1, line 34 - line 39	1-36
A	EP 0 370 835 A (JAMES RIVER CORP) 30 May 1990 see the whole document	1,11
A	US 4 837 078 A (HARRINGTON JAMES H) 6 June 1989 see the whole document	1-36
A	EP 0 557 659 A (MITSUI PETROCHEMICAL IND) 1 September 1993 see the whole document	1-36

Form PCT/ISA/210 (continuation of second sheet) (July 1992)